Remarks

Reconsideration is requested. Claim 1 has been amended. The amendment to claim 1 is supported by the original disclosure, for example Figure 1. Claims 1-6, 8-10, 15, 32-34, 41, 97, 99, and 102 are pending.

Claims 15 and 99 are rejected under 35 USC 102(b) as being anticipated by Abel (US 3,811,749).

In addition, claims 1, 5-6 and 97 are rejected under 35 USC 103(a) as being unpatentable over Abel and Ohzawa (US 5,993,010).

In addition, claims 2 and 4 are rejected under 35 USC 103(a) as being unpatentable over Abel, Ohzawa and Cook (US 4,834,517).

Further, claims 32-34, 41 and 102 are rejected under 35 USC 103(a) as being unpatentable over Abel, Ohzawa, and Willey (US 5,841,574).

Applicants respectfully traverse each of these rejections, and reconsideration is requested in view of the following.

Claims 1, 2, 4-6, 32-34 and 41

Claim 1 is an independent claim, with claims 2, 4-6, 32-34 and 41 depending thereon. Therefore, if claim 1 is patentable, claims 2, 4-6, 32-34 and 41 are patentable along with claim 1.

With respect to claim 1, Abel does not teach or suggest non-axisymmetric reflection surfaces as explained in Applicant's previous response. Further, Abel does not teach or suggest the "free-form surface that does not have a rotational axis" as explained in Applicant's previous response.

Moreover, Abel does not teach an optical device where the non-axisymmetric reflection surfaces are two in total, each of which is composed of a single surface. As noted by the Examiner, the optical apparatus in Abel comprises at least three reflection surfaces 18, 20, 62. The Abel apparatus does not total two reflection surfaces.

In the apparatus disclosed by Ohzawa, the reflection arrays 16, 26 are each composed of a plurality of reflection surfaces (col. 7, lines 7-8 and 30-31; Fig. 8). As a result, the arrays 16, 26 are not "surfaces being in total two, each of which is composed of a single surface".

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The device in Ohzawa is not a device for bringing light fluxes from an object into focus on an image surface, as recited in claim 1. Rather, Ohzawa describes an optical system for illuminating a surface 4 with luminous flux from a light source 30. In an illumination optical system, it is important to irradiate the whole illuminated surface uniformly. The Ohzawa system is configured so that a plurality of luminous fluxes divided by the reflection array 16 are used for realizing uniform illumination of the surface 4 (col. 7, lines 56-58 of Ohzawa).

Therefore, the Abel system, in which each of the at least three reflection surfaces is composed of a single surface, and the Ohzawa system, where each reflection surface is composed of a plurality of reflection surfaces, are non-analogous and are not combinable.

Therefore, claim 1, and all claims depending therefrom, is patentable over Abel and Ohzawa.

Claims 15, 97, 99 and 102

Claim 15 is an independent claim, with claims 97, 99 and 102 depending thereon. Therefore, if claim 15 is patentable, claims 97, 99 and 102 are patentable along with claim 15.

Claim 15 recites that the second reflection surface is concave in a cross-sectional shape taken in the vicinity of its vertex along a plane containing vertices of the reflection surfaces, and is convex in a cross-sectional shape taken in a direction perpendicular to the plane.

This language does not simply mean that the cross-sectional shape of the second reflection surface is concave, but its cross-sectional shape taken in a direction perpendicular to the plane containing vertices of the reflection surfaces is convex. Therefore, the cross-sectional shape of the second reflection surface is concave along one plane, and the cross-sectional shape is convex along another plane.

Page 8 of the office action states:

"The Examiner feels that the rejection is proper as Fig. 1 shows reflector 20 to be concave.".

However, as indicated above, claim 15 does not simply recite a concave cross-sectional shape. Rather, the second reflection surface has both a concave and a convex cross-sectional shape.

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The reflector 20 is a paraboloidal reflector (col. 2, lines 30-31 and Fig. 1 of Abel). As a result, the cross-sectional shape of the reflector 20 is concave both in a plane containing vertices of the reflection surfaces, as well as in a direction perpendicular to the plane containing vertices of the reflection surfaces. The reflector 20 in Abel does not have both a convex cross-sectional shape and a concave cross-sectional shape as claimed.

In addition, the reflector 18 and the reflector 62 in Abel are both paraboloidal reflectors (col. 2, lines 30-31 and col. 3, lines 57-58). Therefore, the foregoing argument concerning reflector 20 applies to the reflectors 18, 62 as well.

Absent a reflector having a convex cross-sectional shape as claimed, Abel does not anticipate claim 15. Claims 97, 99 and 102 depend from claim 15 and are patentable for the reasons given for claim 15 and need not be separately distinguished. By not specifically addressing the rejection to the dependent claims, Applicants do not concede the propriety of the rejection or any statements made in the rejection.

Applicants acknowledge the indication that claims 3 and 8-10 contain allowable subject matter. As discussed above, Applicants believe that all of the examined claims are patentable as well.
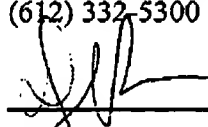
Conclusion

With the above amendments and remarks, Applicants believe that the claims now pending in this patent application are in a condition for immediate allowance. Favorable consideration is respectfully requested. If any further questions arise, the Examiner is welcome to contact Applicants' representative at the number listed below.

Respectfully submitted,

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